An analysis of rent-seeking games with relative-payoff maximizers

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Abstract In this paper, we introduce relative-payoff maximizing firms into the Tullock model of rent-seeking. These firms try to realize higher (expected) payoff than other firms. As a consequence of this, the outcome of the model changes: Firms, on average, will invest more in the rent-seeking process, the rate of dissipation of the rent becomes independent of the number of rent-seekers, dissipation becomes complete in cases where underdissipation prevails in the original model.

Keywords Rent-seeking · Tullock game · Relative payoff

1 Introduction

Since its publication in 1980, the seminal paper on rent-seeking by Tullock (1980) raised an ongoing dispute on the question of how much of the rent will be dissipated by the search costs incurred by rent-seekers. One of Tullock’s most striking findings is that the aggregate investment undertaken not necessarily equals the value of the rent, but may be lower or even higher instead. The finding of possible over- or underdissipation of the rent initiated a broad discussion throughout literature, many contributions trying to explain this finding, to extend its validity, or even to render it invalid. Surveys and in-depth analysis can be found in Tollison (1982), Pérez-Castrillo and Verdier (1992) and Nitzan (1994). Almost any important work on rent-seeking is re-printed in Lockard and Tullock (2001).

An issue rarely examined to this date is the aspect of behavioral motivations of the rent-seekers. Traditionally, the rent-seekers are assumed to be individuals or firms aiming at maximizing their expected net payoffs, i.e. the expected value of the rent minus their investment in the process of rent-seeking. Apart from this ‘standard’ motive of maximizing absolute payoffs, one could imagine at least one other aim, the ‘competitive’ motive of maximizing relative payoffs. A firm could strive for being ahead of its competitors by...
making higher profits (i.e. absolute payoffs) than the others. Apart from experimental evidence indicating the existence of ‘other regarding preferences’ (Bolton and Ockenfels 2000; Charness and Rabin 2002; Fehr and Schmidt 1999), there are more arguments supporting this behavioral inclination. Firms’ managers could be paid according to the relative success of their firms, where the manager of the most successful firm earns the highest payment, etc., a payment scheme which is frequently promoted throughout literature, e.g. in Lazear and Rosen (1981). Another reason could be a firm’s lack of information. Vriend (2000) and Riechmann (2006) show—in an oligopolistic context—that firms who are not able to determine their optimum behavioral strategy by introspection and are thus forced to mimic successful competitors de-facto become maximizers of relative payoff. Learning by imitation of successful others is equivalent to maximizing the relative payoff.

In this paper, we will demonstrate that one important feature of the Tullock (1980) model of rent-seeking is that maximization of absolute compared to maximization of relative payoff does not lead to identical economic results. Being more successful than others (in terms of expected payoff) does not imply attaining maximum absolute payoff. The specific structure of the Tullock model is open for a ‘spite effect’ in the sense of Hamilton (1970): By increasing its investment beyond the equilibrium level, a firm can increase its payoff to a level higher than the other firms’ payoffs. A certain type of a player’s unilateral deviation from the Nash equilibrium will lower this player’s absolute payoff but will at the same time lower the opponents’ payoffs even further, such that the deviator loses in absolute but gains in relative terms.

It may not be very realistic to assume that all players in a rent-seeking contest behave as maximizers of relative payoff. Still, the existence of at least one or a few players of this type cannot be ruled out a priori. Consequently, it is an important question to ask for the implications the existence of these players generates for individual behavior of the rent-seekers and the degree of rent-dissipation. This is the central question of this paper.

The paper will proceed as follows. After the introduction of the basic idea of maximization of relative payoffs in a simple $2 \times 2$-game, we will first consider homogeneous societies of rent-seekers. In Sect. 3.1, we will review the Tullock model, by that establishing a benchmark solution. In Sect. 3.2, we develop a model with only maximizers of relative payoff and derive the results for the behaviorally opposite case to the standard Tullock model. Finally, Sect. 4 integrates the two polar cases by analyzing a model of a heterogeneous society, populated by both types of firms, maximizers of absolute and maximizers of relative payoffs. The most striking result of this analysis will be the finding that the degree of dissipation of the rent approaches full dissipation if the relative share of maximizers of relative payoff is comparably high.

2 A $2 \times 2$ illustration of a model of heterogeneous objectives

In order to get a brief notion of the differences between maximization of absolute and relative payoffs, let us consider the simple $2 \times 2$-game in simultaneous moves with (absolute) payoffs given in Table 1(a). There are two players, player $A$ and $R$. Given both players aim at maximizing their absolute payoffs, both have $s_1$ as their strictly dominant action, such that $(s_1, s_1)$ is the only Nash equilibrium of the game.

Note that this definition of the term ‘competitive’ is one that is frequently used by classical economists. Marshall (1890, Book I, Chap. I, 13) describes competition as ‘the racing of one person against another’, an act that, as Schlicht (2004) points out, may very well include spiteful behavior.